

The Multi-Megawatt Refrigerator/Freezer Recycling Summer Initiative Program Final Report

Sponsored by the California Public Utilities Commission Administrator: Southern California Edison Contractor: Appliance Recycling Centers of America, Inc. **December 2001**

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Executive Summary

The California Public Utilities Commission (CPUC) authorized the Refrigerator/Freezer Recycling Program for implementation in July 2000. The program targeted the removal and environmentally sound recycling of approximately 36,000 operating, energy-inefficient refrigerators and freezers from residential electric customers in seven Bay Area counties served by Pacific Gas and Electric (PG&E) and the entire San Diego Gas and Electric (SDG&E) service territory. Given their long-term experience in the administration of a similar program, Southern California Edison (SCE) was appointed administrator. Appliance Recycling Centers of America, Inc. (ARCA) was awarded the implementation contract. Features of the program included:

- A \$75.00 incentive to residential electric customers in the target areas for working spare and replaced primary refrigerators and freezers.
- Easy enrollment and scheduling of eligible appliance pickup through toll-free telephone lines or a dedicated Internet website.
- In-home appliance removal.
- Recycling of appliances in compliance with federal and state laws along with the processing of CFC-11 from the polyurethane foam insulation.

The first order for the program was taken in September 2000 and the last pickup occurred in August 2001. During those 12 months, the program achieved the following results:

- Permanent removal from service and environmentally optimal recycling of 36,685 energy-inefficient refrigerators and freezers (23,750 from PG&E and 12,935 from SDG&E).
- Retirement of approximately 3% of the eligible inventory of appliances in the target areas.
- Electric savings, which are evaluated by two methods in this report. The results are:
 - For PG&E:
 - o Lifetime savings from 227,002,500 kWh to 242,979,864 kWh.
 - o Summer peak reduction from 6.20 to 6.65 MW.
 - For SDG&E:
 - o Lifetime savings from 123,632,730 kWh to 132,435,852 kWh.
 - o Summer peak reduction from 3.39 to 3.62 MW.
 - Total Program Savings:
 - o Lifetime savings from 350,635,230 kWh to 375,415,716 kWh.
 - o Summer peak reduction from 9.58 to 10.27 MW.
- Cost of conserved energy from \$0.023/kWh to \$0.024/kWh.
- Program completed two months ahead of schedule.
- Recycling introduced more than 25,000 tons of scrap metals into the area market; captured over 13,500 pounds of refrigerants and 2,600 gallons of compressor oil; properly managed nearly 2,300 pounds of PCB-laden capacitors; and recovered more than a pound of mercury.

Introduction

The Summer Initiative Refrigerator/Freezer Recycling Program was instituted as a result of CPUC Decision 00-07-017 that sought innovative approaches to electricity conservation. This approach was adopted in part to foster the acquisition of additional demand-side resources to assist the state of California in avoiding the expected shortfall of electricity that was forecasted to occur during the summer of 2001.

The program described herein was a collaborative effort among three distinct entities: the California Public Utilities Commission, Southern California Edison and Appliance Recycling Centers of America, Inc., which lent specific expertise in the design and delivery of this very successful and highly cost-effective electricity conservation and environmentally beneficial program.

Background

The CPUC began the process of seeking candidate projects for the Summer Initiative in June 2000, and by the next month, received candidate proposals for review. In August, the CPUC selected a variety of proposals for funding.

ARCA's proposal sought funding for a refrigerator and freezer recycling program. This proposal basically extended the energy-efficiency program services that ARCA had provided to residential customers of SCE since 1993 into the entire service territory of San Diego Gas and Electric and portions of the area served by Pacific Gas and Electric. ARCA recommended the target areas as identified by the Independent System Operator (ISO) as areas of transmission constraint.

The CPUC accepted the proposal submitted by ARCA and, in recognition of the success that SCE had had in operating its program, appointed SCE to serve as the administrator for the program in the Bay Area and San Diego.

Under the terms of the contract, ARCA was to implement the program on a turnkey basis by providing all program elements: advertising, public relations, customer service (including fielding requests for information and scheduling appointments), transportation, in-home appliance removal and recycling services. SCE was to direct the activities of ARCA and to coordinate the financial and other interests of SDG&E and PG&E. With the establishment of a mechanism by which SDG&E and PG&E would provide funding to SCE for program activities within their service territories and the signing of the contract between SCE and ARCA, the Summer Initiative Refrigerator/Freezer Recycling program began operation in September 2000.

Program Description

Summer Initiative Refrigerator/Freezer Recycling Program

- Only **working** spare and primary refrigerators and freezers were eligible.
- Customers received a \$75.00 per unit incentive for refrigerators and freezers. (Checks were mailed within four to six weeks after pickup.)
- Guidelines provided for the limit of two units (in any combination) per customer per year.
- Customers were required to own the appliance or have the owner's written consent.
- Participants must have been residential electric customers of PG&E or SDG&E living in one of the following eligible counties:
 - ✓ San Diego and south Orange Counties (SDG&E).
 - ✓ Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara and Santa Cruz Counties (PG&E Bay Area).
- Landlords and rental property owners/managers were not eligible for the program but tenants who owned their appliances were.
- Customers were required to be at home and the appliance must have been in working order (cooling) at time of pickup.
- Municipal utility customers were not eligible for the program.

Advertising and Public Relations

As provided for in the contract, ARCA was charged with responsibility for the development and placement of all media advertising and public relations efforts in support of the program. ARCA developed a broad-based advertising and media campaign using the 30-second "Lucky the Dog" television ad as the cornerstone. The TV ad was supported by complementary newspaper print ads and Point Of Sale (POS) flyers placed in retail appliance venues. Copies of the printed materials are provided in this report.

From the outset, ARCA was challenged to market the program without utility company support. PG&E expressed reluctance to support the program since it was available only to residents of the seven Bay Area counties and not to their entire franchise area. The first hurdle surmounted was gaining permission from the utilities to use their company names in the advertising to better state program eligibility criteria and to replace the words "residential electric customer of an investor-owned utility." This was needed to clarify that program participation was limited to residential electric customers of PG&E and SDG&E (including those customers residing in Orange County) and not to any municipal utilities. By the end of 2000, PG&E followed SDG&E's lead in giving ARCA permission to use their company name in advertising.

ARCA did not have access to the electric companies' bill inserts, which have traditionally been a credible means of creating awareness of energy-efficiency programs as well as

productive in soliciting requests for participation. An alternative mechanism emerged from the relationships ARCA established with cable television providers in the two program areas, through which ARCA was able to purchase placement of cable television bill inserts with program information. In spite of ARCA's intent to target specific zip codes in the cable television bills, a small number were distributed in nonprogrameligible areas. In those instances, ARCA worked with media and customers to explain the nature of the program and the reasons that specific areas had been targeted.

Distribution of POS materials to all appliance retailers that served the program market areas was also challenging as utility company support varied. SDG&E distributed the ARCA-produced materials directly to retailers as part of their ongoing effort to promote ENERGY STAR® appliances. Because PG&E elected not to pursue this option, ARCA distributed the POS materials directly to appliance retailers in their area through a combination of direct mail and on-site visits.

The program received a fair amount of media coverage, largely in response to a press release that ARCA developed and distributed. KRON Television in San Francisco featured the program on a newscast in February 2001. Newspaper coverage ranged from articles in weekly area newspapers such as the *Contra Costa Times* to a front-page article appearing in the *San Jose Mercury* on Sunday, April 22, 2001. That article generated more than 10,000 telephone requests for program information in one day, triple the historical call volume.

These feature stories caused a dramatic increase in consumer requests immediately following their placement, resulting in the development of a backlog of orders in areas where the stories appeared. The uneven intake of orders from public relations efforts was not anticipated and required an extraordinary response from ARCA that included the addition of inbound telephone lines and supporting switching equipment in the customer call center. In addition, the transportation department found it necessary to adjust its operation in order to accommodate the increase in volume in the affected areas. All of this occurred when public interest in the electricity situation was heightened, given the dire warnings of impending blackouts and potential rate increases.

Program Delivery

Consumers could request participation in the program by calling a toll-free telephone number or by signing up via a dedicated Internet website. Approximately 4% of all orders received were through the website.

Once an appointment date was scheduled, ARCA contacted customers two times: once via a mailed letter reminding them of their appointment date and time, and then again with a phone call the evening before the appointed date. In each instance, customers were reminded that the appliance needed to be in operating condition. During the evening phone call, customers were asked to plug in the appliance so that it would be cold upon the collection team's arrival the following day.

On the day of the appointment, ARCA dispatched a collection vehicle and crew to the customer's home. To maximize the energy savings of the program, ARCA did not accept any nonworking appliances. The crew verified the working (cooling) condition of the appliance and, once verified, disabled the appliance by cutting the electric cord at the base of the compressor motor. At that time, ARCA took legal title to the appliance directly from the customer to ensure that the company would be fully responsible for proper recycling. The appliance was then transported to ARCA's recycling center in Compton for disassembly and recycling.

Once at the center, the appliances were processed to include proper management of PCBs and other hazardous or regulated materials, and the recovery and reclamation of all refrigerants (CFCs, HCFCs) in full accordance with local, state and federal mandates. ARCA also removed mercury switches (typically found in chest freezers) and the oil from all compressors during the recycling process. These substances were then managed in compliance with Article 10 (beginning with Section 25211) of Chapter 6.5 of Division 20 of the California Health and Safety Code, Chapter 3.5 (beginning with Section 42160 of Part 3 of Division 30) of the California Public Resources Code. The processing of CFC-11 from refrigerators and freezers containing polyurethane foam, an optional service requested by the Commission, using ARCA's proprietary equipment was then completed. Upon removal of the regulated materials and substances, the remaining materials were transported to ferrous and nonferrous recycling facilities.

Results

A total of 33,292 households participated in the program: 11,831 in the SDG&E service territory and 21,461 in the area served by PG&E. The number of households is fewer than the number of appliances removed from service to reflect that some participants turned in multiple appliances. The table below provides detail on the number of participating households and appliances picked up in each service territory.

	PG&E	SDG&E
Number of Households	21,461	11,831
Refrigerators	19,502	10,856
Freezers	4,248	2,079
Total Appliances	23,750	12,935

Electric Savings — **Evaluation Methodology One**

Two methods of calculating the energy and power savings from the program are presented in this report. The first set of tables is based on the methodology used when the program was first proposed to the CPUC. This methodology uses an average of 1,593 kWh and a demand reduction of .28 per appliance with a remaining useful life of six years. The tables provide first-year and lifetime kWh savings and MW reductions achieved for each of the program areas and for the entire program.

Evaluation Methodology One Results

Pacific Gas & Electric Summer Initiative Results						
Appliances by Type Number of kWh Savings						
Refrigerator	19,502	31,066,686	186,400,116	5.46056	82%	
Freezer	4,248	6,767,064	40,602,384	1.18944	18%	
Total Savings 37,833,750 227,002,500 6.65000 100% Total Units 23,750						

San Diego Gas & Electric Summer Initiative Results						
Appliances by Type Number of Lifetime kWh Reduction Reduction % of Total						
Refrigerator	10,856	17,293,608	103,761,648	3.03968	84%	
Freezer	2,079	3,311,847	19,871,082	0.58212	16%	
Fotal Savings 20,605,455 123,632,730 3.62180 100% Total Units 12,935						

Refrigerator/Freezer Recycling Combined PG&E and SDG&E Results						
Appliances by Type Number of Lifetime kWh Savings Lifetime kWh Reduction % of Total						
Refrigerator	30,358	48,360,294	290,161,764	8.50024	83%	
Freezer	6,327	10,078,911	60,473,466	1.77156	17%	
Total Savings 58,439,205 350,635,230 10.27180 100% Total Units 36,685						

Electric Savings — Evaluation Methodology Two

The second method of calculating savings from the program emerged in late 2001 in association with CPUC Proceeding Number R.01-08-028. Electric savings under this methodology were calculated using the per-unit savings (refrigerators = 2,148 kWh and .33 kW reduction; freezers = 2,058 kWh and .31 kW reduction per appliance; six years of remaining useful life) figures from the *Final Report Impact Evaluation of the Spare Refrigerator Recycling Program CEC Study #537* evaluation performed by Xenergy for Southern California Edison. The CPUC-provided Net-To-Gross ratio of .8 was then applied. The tables below provide first-year and lifetime kWh savings and MW reductions achieved for each of the program areas and for the entire program.

Evaluation Methodology Two Results

Pacific Gas & Electric Summer Initiative Results						
Appliances by Type Number of kWh Savings Lifetime kWh Savings MW Reduction % of Total						
Refrigerator	19,502	33,504,436	201,026,616	5.148528	83%	
Freezer	4,248	6,992,208	41,953,248	1.053504	17%	
Total Savings 40,496,644 242,979,864 6.202032 100%						
Total Units	23,750					

San Diego Gas & Electric Summer Initiative Results						
Appliances by Type Number of Units First-Year kWh Savings Lifetime kWh Savings MW Reduction % of Total						
Refrigerator	10,856	18,650,608	111,903,648	2.87000	85%	
Freezer	2,079	3,422,034	20,532,204	0.52000	15%	
Total Savings		22,072,642	132,435,852	3.39000	100%	
Total Units	12,935					

Evaluation Methodology Two Results, Continued

Refrigerator/Freezer Recycling Combined PG&E and SDG&E Results						
Appliances by Type Number of kWh Savings Lifetime kWh Savings MW Reduction % of Total						
Refrigerator	30,358	52,155,044	312,930,264	8.014512	84%	
Freezer	6,327	10,414,242	62,485,452	1.569096	16%	
Total Savings		62,569,286	375,415,716	9.583608	100%	
Total Units	36,685					

Application of the second methodology yields an increase in energy (kWh) savings but a decrease in the demand (MW) reduction.

Environmental Benefits

The program provided environmental benefits in addition to electric savings. The recycling of appliances was conducted in ARCA's fully permitted and licensed recycling center, located in Compton, California. Of special note was the program's provision to capture CFC-11 from the polyurethane foam insulation in the appliances. Although the processing of polyurethane foam from appliances is not currently required by federal or state regulations, the procedure has been a requirement of SCE's refrigerator recycling program since 1993.

The tables below show the amounts and types of materials recovered from refrigerators and freezers in the program.

Pacific Gas and Electric Service Territory

Appliance Type	Number of Units	% of Total Units by Type
CFC-11 Refrigerators	13,638	84.50%
CFC-11 Freezers	2,502	15.50%
Totals	16,140	100%

Material	Weight	Measure
Scrap Metal	23,750.00	Tons
CFC/HCFC	8,796.55	Pounds
Refrigerants	6,796.55	Poullus
Compressor Oil	1,738.45	Gallons
Capacitors	1,484.38	Pounds
Mercury Switches	.80	Pounds

San Diego Gas and Electric Service Territory

Appliance Type	Number of Units	% of Total Units by Type
CFC-11 Refrigerators	8,883	90.71%
CFC-11 Freezers	910	9.29%
Totals	9,793	100%

Material	Weight	Measure
Scrap Metal	1,293.50	Tons
CFC/HCFC Refrigerants	4,789.50	Pounds
Compressor Oil	946.55	Gallons
Capacitors	808.44	Pounds
Mercury Switches	.39	Pounds

Combined PG&E and SDG&E Results

Appliance Type	Number of Units	% of Total Units by Type
CFC-11 Refrigerators	22,521	86.84%
CFC-11 Freezers	3,412	13.16%
Totals	25,933	100%

Material	Weight	Measure
Scrap Metal	25,043.50	Tons
CFC/HCFC Refrigerants	13,586.05	Pounds
Compressor Oil	2,685.00	Gallons
Capacitors	2,292.82	Pounds
Mercury Switches	1.19	Pounds

Program Costs

The cost of the Summer Initiative Refrigerator/Freezer Recycling Program was \$8,499,408.10. This figure includes all program costs, including customer service, inhome appliance removal, transportation, recycling, consumer incentives, and advertising and marketing.

On a cost of conserved energy basis, the program cost was \$0.024 using Evaluation Method One or \$0.023 per kilowatt-hour using Evaluation Method Two.

Conclusions

The program was a cost-effective electric resource energy acquisition effort that proved to be popular with consumers and appliance retailers. A recent study published by the Natural Resources Defense Council (NRDC) concluded that it is "now difficult to save significant amounts of energy by simply persuading consumers to buy new appliances that are more efficient than the standards require. In fact, the annual energy saved by buying a new ENERGY STAR® compliant refrigerator instead of a standard one is

roughly the same as what can be saved by one compact fluorescent lamp, roughly 50 to 100 kWh/yr." This report supports the need for public-benefit programs to require retirement and environmentally sound recycling of older, energy-inefficient appliances in concert with the promotion of the purchase of new, energy-efficient models.

The market characteristics of refrigerators and freezers in the PG&E and SDG&E service territory areas targeted by the Summer Initiative Refrigerator/Freezer Recycling Program are listed below. These figures were derived using the results from the *California Statewide Residential Lighting and Appliance Saturation Study* performed by RLW Analytics in 2000.

Annual Primary Refrigerator Replacements
Spare Refrigerators
Freestanding Freezers
Total Eligible Inventory

172,000*
466,650**
497,760***
1,136,410

*70% of working models reenter market **68% built before 1990 ***55% built before 1990

These figures represent a snapshot of the market. It is important to note that any intervention in the market, such as was accomplished by the program, produces immediate and measurable advances in the inventory of existing appliances. It is also important to note that the program, while realizing significant energy savings, reached only approximately 3% of the eligible market, leaving vast potential for energy savings resident in the remaining 97% of the market.

A unique impact of the program was its ability to deliver from 9.5 to 10 MW (depending on the evaluation method used) of peak reduction from the residential customer class in just over 12 months, two months ahead of schedule.

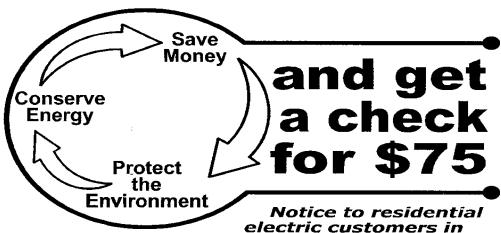
Expansion of this program to more consumers in a wider geographic area could produce similar significant savings. For example, a modest 10% increase in participation that collected approximately 100,000 refrigerators and freezers would yield over 159,000MWh/year and achieve 28 MW in peak usage. ARCA is confident in its abilities to accomplish a project of this size in a one-year time frame.



English Version Point Of Sale (SDG&E Area)



Spanish Version Point Of Sale (SDG&E Area)



Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara & Santa Cruz Counties

let us recycle your ····· old, opérating ····· refrigerator or freezer

Get a check for \$75 and save an average of \$200-\$300 annually on your electric bill*

- *Estimates based on refrigerator & freezer models using 2,000-3,000 kWh/year at \$.10/kWh. Your savings may vary.
- Call today to find out if you qualify and to schedule an appointment for free collection
- and environmentally sound recycling of your operating refrigerator or freezer.

800-599-57 (TDD 1-800-457-2911) 6 a.m. - 6 p.m. M-F

Help Conserve Our Valuable California Power Supply

Program funded by California electric utility customers under the auspices of the California Public Utilities Commission and offered on a first come-first served basis through 12/31/01 or until funding is expended. Refrigerators and freezers must be in working condition and at least 10 cubic feet in size; customer must own unit(s) turned in for recycling; limit two units per residential electric account. \$75 check will be mailed to customer within four weeks after collection. Some restrictions apply.



Sample Newspaper Ad (PG&E Area)



Over the past five years, 250,000 operating, energy-inefficient refrigerators and freezers have been permanently removed from service by California electric utility companies sponsoring Refrigerator Recycling Programs. The energy saved from retiring these appliances would power 650,000,000 strings of Christmas lights for a month, a string that would circle the Earth nearly five times. Now the Refrigerator Recycling Program has been extended in Southern California...

If you are a residential electric customer living in San Diego County, let us recycle your old, operating refrigerator or freezer.

GET A CHECK FOR \$75

SAVE AN AVERAGE OF \$200-\$300

ANNUALLY ON YOUR ELECTRIC BILL*

Call today to find out if you qualify and to schedule an appointment for free collection and environmentally sound recycling of your operating refrigerator or freezer.

1-800-599-5792(TDD 1-800-457-2911)
8 a.m. -5 p.m. M-F
www.8005995792.com

*Estimates based on refrigerator & freezer models 10 years or older.

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Special Holiday Newspaper Ad (SDG&E Area)